

CLAIMS

What is claimed is:

1. A method for self-routing a packet through a $b2^n \times b2^n$ switching network

5 comprising

configuring the switching network with (a) 2^n output groups, each of the

output groups having a distinct n-bit binary address in the form of $b_1b_2 \dots b_n$ with b

indistinguishable output ports, and (b) k super-stages of concentrators wherein each of the

concentrators is a $2b \times 2b$ partial sorting network of interconnected routing cells and b of its

10 $2b$ output ports are grouped into a 0-output group while the remaining b output ports are

grouped into a 1-output group, the network being characterized by the guide $\gamma(1), \gamma(2), \dots,$

$\gamma(k)$, where γ is a mapping from the set $\{1, 2, \dots, k\}$ to the set $\{1, 2, \dots, n\}$, and wherein

the packet is either a real data packet destined for the output group at the binary output

destination address $d_1d_2 \dots d_n$, or an idle packet having no pre-determined destination,

15 generating a routing tag $1d_{\gamma(1)}d_{\gamma(2)} \dots d_{\gamma(k)}$ for the real data packet with

reference to the guide and the destination address, and

routing the real data packet through the network by using $1d_{\gamma(j)}$ in the

routing tag in the j-th super-stage concentrator, $1 \leq j \leq k$, to select between the 0-output group

or the 1-output group of the j -th super-stage concentrator to emit the real data packet.

2. A method for self-routing a packet through a $b2^n \times b2^n$ switching network, the network: including 2^n output groups, each of the output groups having a distinct n -bit binary address in the form of $b_1b_2 \dots b_n$ with b indistinguishable output ports, and k super-stages of concentrators wherein each of the concentrators is a $2b \times 2b$ partial sorting network of interconnected routing cells and b of its $2b$ output ports are grouped into a 0-output group while the remaining b output ports are grouped into a 1-output group; and being characterized by the guide $\gamma(1), \gamma(2), \dots, \gamma(k)$, where γ is a mapping from the set $\{1, 2, \dots, k\}$ to the set $\{1, 2, \dots, n\}$, and wherein the packet is either a real data packet destined for the output group at the binary output destination address $d_1d_2 \dots d_n$, or an idle packet having no pre-determined destination, the method comprising

generating the routing tag $1d_{\gamma(1)}d_{\gamma(2)} \dots d_{\gamma(k)}$ for the real data packet with

reference to the guide and the destination address, and

routing the real data packet through the network by using $1d_{\gamma(j)}$ in the routing tag in the j -th super-stage concentrator, $1 \leq j \leq k$, to select between the 0-output group or the 1-output group of the j -th super-stage concentrator to emit the real data packet.

3. A system for self-routing a packet comprising

a $b2^n \times b2^n$ switching network, the switching network having (a) 2^n output groups, each of the output groups having a distinct n -bit binary address in the form of $b_1b_2\dots b_n$ with b indistinguishable output ports, and (b) k super-stages of concentrators

- 5 wherein each of the concentrators is a $2b \times 2b$ partial sorting network of interconnected routing cells and b of its $2b$ output ports are grouped into a 0-output group while the remaining b output ports are grouped into a 1-output group, the network being characterized by the guide $\gamma(1), \gamma(2), \dots, \gamma(k)$, where γ is a mapping from the set $\{1, 2, \dots, k\}$ to the set $\{1, 2, \dots, n\}$, and wherein the packet is either a real data packet destined for
- 10 the output group at the binary output destination address $d_1d_2\dots d_n$, or an idle packet having no pre-determined destination,

a generator for generating a routing tag $1d_{\gamma(1)}d_{\gamma(2)}\dots d_{\gamma(k)}$ for the real data packet with reference to the guide and the destination address, and

routing control circuitry for routing the real data packet through the network

- 15 by using $1d_{\gamma(j)}$ in the routing tag in the j -th super-stage concentrator, $1 \leq j \leq k$, to select one between the 0-output group or the 1-output group of the j -th super-stage concentrator to emit the real data packet.